

WHAT IS CLAIMED IS:

1. A composition comprising kaolin having a shape factor of at least about 20, wherein at least about 80 % by weight of the kaolin has an esd of less than about 1 μm , and the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 25% to about 60% by weight.
2. The composition according to claim 1, wherein the kaolin has a Hercules viscosity of less than about 4000 rpm at 18 dynes at 63% solids when measured using the "A" bob.
3. The composition according to claim 1, wherein the kaolin has a Hercules viscosity of less than about 2750 rpm at 18 dynes at 66% solids when measured using the "A" bob.
4. The composition according to claim 1, wherein the kaolin has a Hercules viscosity of less than about 1500 rpm at 18 dynes at 69% solids when measured using the "A" bob.
5. The composition according to claim 1, wherein at least about 94% by weight of the kaolin has an esd of less than about 2 μm
6. The composition according to claim 1, wherein at least about 95% by weight of the kaolin has an esd of less than about 2 μm .
7. The composition according to claim 1, wherein at least about 96% by weight of the kaolin has an esd of less than about 2 μm .
8. The composition according to claim 1, wherein at least about 98% by weight of the kaolin has an esd of less than about 2 μm .
9. The composition according to claim 1, wherein the amount of the kaolin having an esd of less than about 2 μm ranges from about 94% to about 99% by weight.
10. The composition according to claim 1, wherein at least about 85% by weight of the kaolin has an esd of less than about 1 μm .
11. The composition according to claim 1, wherein at least about 88% by weight of the kaolin has an esd of less than about 1 μm .
12. The composition according to claim 1, wherein at least about 92% by weight of the kaolin has an esd of less than about 1 μm .

13. The composition according to claim 1, wherein the kaolin has a shape factor of at least about 30.

14. The composition according to claim 1 wherein the kaolin has a shape factor of at least about 40.

15. The composition according to claim 1, wherein the kaolin has a shape factor of at least about 50.

16. The composition according to claim 1, wherein the kaolin has a shape factor ranging from about 20 to about 60.

17. The composition according to claim 1, wherein the kaolin has a shape factor ranging from about 40 to about 50.

18. The composition according to claim 1, wherein the kaolin has a shape factor ranging from about 30 to about 40.

19. The composition according to claim 1, wherein the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 35% to about 50% by weight.

20. The composition according to claim 1, wherein the kaolin has a shape factor ranging from about 45 to about 50, at least about 96% by weight of the kaolin has an esd of less than about 2 μm , at least about 80% by weight of the kaolin has an esd of less than about 1 μm , and the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 35% to about 45% by weight.

21. A method of refining kaolin, comprising:

- (a) providing a degrittied kaolin slurry comprising a sedimentary kaolin having a particle size distribution such that at least about 70% by weight of the kaolin has an esd of less than about 2 μm ;
- (b) classifying said kaolin slurry to obtain a kaolin having a shape factor of at least about 20, wherein at least about 94% by weight of the kaolin has an esd of less than about 2 μm .

22. The method according to claim 21 wherein the degrittled kaolin slurry comprises a substantially stackless sedimentary kaolin.

23. The method according to claim 21, wherein the kaolin has a Hercules viscosity of less than about 4000 rpm at 18 dynes at 63% solids when measured using the "A" bob.

24. The method according to claim 21, wherein the kaolin has a Hercules viscosity of less than about 2750 rpm at 18 dynes at 66% solids when measured using the "A" bob.

25. The method according to claim 21, wherein the kaolin has a Hercules viscosity of less than about 1500 rpm at 18 dynes at 69% solids when measured using the "A" bob.

26. The method according to claim 21, wherein the amount of the classified kaolin having an esd of less than about 0.25 μm ranges from about 25% to about 60% by weight.

27. The method according to claim 21, wherein the degrittled kaolin slurry provided in (a) comprises at least about 80% by weight of the kaolin having an esd of less than about 2 μm .

28. The method according to claim 21, wherein the degrittled kaolin slurry provided in (a) has a shape factor of at least about 10.

29. The method according to claim 21, further comprising a wet media grinding step prior to (b).

30. The method according to claim 29, wherein the wet media grinding consumes in the range of 0 to about 35 Kw-hr/ton of energy.

31. The method according to claim 29, wherein the wet media grinding consumes in the range of about 35 to about 200 Kw-hr/ton of energy.

32. The method according to claim 21, further comprising subjecting the degrittled kaolin slurry to a beneficiation step selected from: selective flocculation, ozone treatment, flotation, magnetic separation, leaching, or any combination thereof.

33. The method according to claim 21, further comprising subjecting the classified kaolin to a beneficiation step selected from: selective

flocculation, ozone treatment, flotation, magnetic separation, leaching, or any combination thereof.

The method according to claim 21, wherein the classifying in (b) comprises removing a portion of the fines.

35. The method according to claim 21, wherein the degrittled kaolin slurry provided in (a) has a shape factor of at least about 15 and at least about 80% by weight of the kaolin in the degrittled kaolin slurry has an esd of less than about 2 μm .

36. The method according to claim 34, wherein after removing the portion of fines, the particle size distribution ranges from about 25% to about 60% by weight less than about 0.25 μm .

37. The method according to claim 34, wherein after removing the portion of fines, the particle size distribution is about 40% by weight less than about 0.25 μm .

38.A method of refining kaolin, comprising:

(a) providing a degrittled kaolin slurry having a shape factor of at least about 10 and including at least about 80% by weight particles having an esd of less than about 2 μm ;

(b) wet media grinding the degrittled kaolin slurry consuming in the range of from about 10 to about 200 Kw-hr/ton of energy; and

(c) classifying the slurry to a fine fraction wherein at least about 80% by weight of the kaolin has an esd of about 1 μm .

39. The method according to claim 38, wherein at least about 94% by weight of the kaolin has an esd of less than about 2 μm .

40. The method according to claim 38, wherein the degrittled kaolin slurry provided in (a) has a shape factor of at least about 20.

41. The method according to claim 38, wherein the degrittled kaolin slurry provided in (a) has a shape factor of at least about 30.

42. The method according to claim 38, wherein the degrittled kaolin slurry provided in (a) has a shape factor of at least about 40.

43. The method according to claim 38 in part (c), wherein the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 25% to about 60% by weight.

44. The method according to claim 38, further comprising spray-drying the fine fraction.

45. The method according to claim 38, wherein the kaolin slurry is subjected to a beneficiation step selected from: selective flocculation, ozone treatment, flotation, magnetic separation, leaching, or any combination thereof.

46. The method according to claim 38, further comprising leaching the kaolin fine fraction and filtering and drying the leached kaolin fine fraction.

47. A coated paper comprising:

a fibrous substrate; and

a coating on the substrate comprising kaolin having a shape factor of at least about 20, wherein at least about 80% by weight of the kaolin has an esd of less than about 1 μm ; the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 25% to about 60% by weight.

48. The paper according to claim 47, wherein at least about 94% by weight of the kaolin has an esd of less than about 2 μm .

49. The paper according to claim 47, wherein the kaolin has a Hercules viscosity of less than 4000 rpm at 18 dynes at 63% solids and less than 1500 rpm at 18 dynes at 69% solids when measured using the "A" bob.

50. The paper according to claim 47, wherein the coating further comprises calcium carbonate.

51. A method of making a coated paper comprising:

coating a fibrous substrate with a paper coating composition comprising kaolin having a shape factor of at least about 20, at least 80% by weight of the kaolin has an esd of less than 1 μm , and the amount of the kaolin having an esd of less than about 0.25 μm ranges from about 25% to about 60% by weight.

52. The method of claim 51, wherein at least about 94% by weight of the kaolin has an esd of less than about 2 μm .

53. The method of claim 51, wherein the kaolin has a Hercules viscosity of less than 4000 rpm at 18 dynes at 63% solids and less than 1500 rpm at 18 dynes at 69% solids when measured using the "A" bob.

54. A method of making a kaolin slurry, comprising:

dewatering kaolin with an evaporator, wherein the kaolin has a shape factor of at least about 50, and at least about 85% by weight of the kaolin has an esd less than about 2 μm .

55. A method of making a kaolin slurry, comprising:

dewatering kaolin with an evaporator, wherein the kaolin has a shape factor of at least about 25, and at least about 85% by weight of the kaolin has an esd less than about 2 μm .